Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

metamorphosed and pulled and stretched into peculiar forms. To the writer, it is one of the finest views and places for dynamic study in Iceland.

The view from the brink of this canyon across to the ice mountains is one of great beauty. Looking up from the hayfields, the ice-crowned pyramids stand,

> "Like giants clad in armor blue,
> With helmets of a silver hue."

RICE IN THE UNITED STATES

BY

G. T. SURFACE, PH.D.

When European explorers found the new world in their search for an all-sea route to Southern Asia, they and their merchant countrymen conceived the idea of producing in these new lands the chief commodities of import from Africa, Asia and the East Indies. Sugar, tea, spices, indigo, silk, rice and cotton were in demand in Europe, but sugar figured most actively during the fourteenth and fifteenth centuries in industrial experimentation, as well as in trade manipulation. In the early decades of Virginia colonization attempts were made in cotton, silk and rice culture without success. In the Carolinas indigo and tea were added to the experimental list. The production of indigo flourished only temporarily, but cotton and rice maintained successfully a survival struggle, even after the introduction of tobacco from Virginia and sugar cane from Georgia.

Rice had so fully demonstrated its usefulness as a nutritious and easily transported food that persistent attempts were in progress to extend its cultivation in Spain, Italy and the Mediterranean islands; but, on account of the small amount of land adapted to crude methods of irrigation, increase of production had not kept pace with the increase in consumption. The first attempt at growing rice in the colonies was made in Virginia by Sir William Berkeley in 1647, but the inferior adaption of climate and the phenomenal field and market success of tobacco repressed the exploitation of rice, and it remained for South Carolina, a half century later (1694), to realize more encouraging results by planting white East India rice, accidentally obtained from a stranded Madagascar ship. Subsequently, rice was grown in South Carolina, and about 1725 began to assume commercial importance, the export for that year being 9,212,000 pounds. The expansion of the industry was rapid from 1725 to 1740 (400 per cent.), but from 1740 to 1840 the increase was less than 100 per cent. The effect of the Civil War on the industry was so disastrous that the average production from 1840 to 1850 was greater than from 1850 to 1880.

The Cajuns (or Cajans), of Acadian ancestry, began the garden cultivation of "Providence" rice in Louisiana about the middle of the eighteenth century. They planted small plots and cultivated them by the crudest methods, so that the first century of rice culture in America's greatest rice belt effected little more industrially than to demonstrate the adaptation of the soil and climate to produce the crop. Although New Orleans handled all of the surplus, there was only one rice mill in the city in 1840. Greater interest was, however, being manifested in rice as a money crop, the significance of which may be inferred by the construction of eight additional mills in New Orleans from 1840 to 1880. The Census of 1880 gave Louisiana a production of 23,000,000 pounds, as compared with Georgia's 25,000,000, and South Carolina's 52,000,000 pounds.

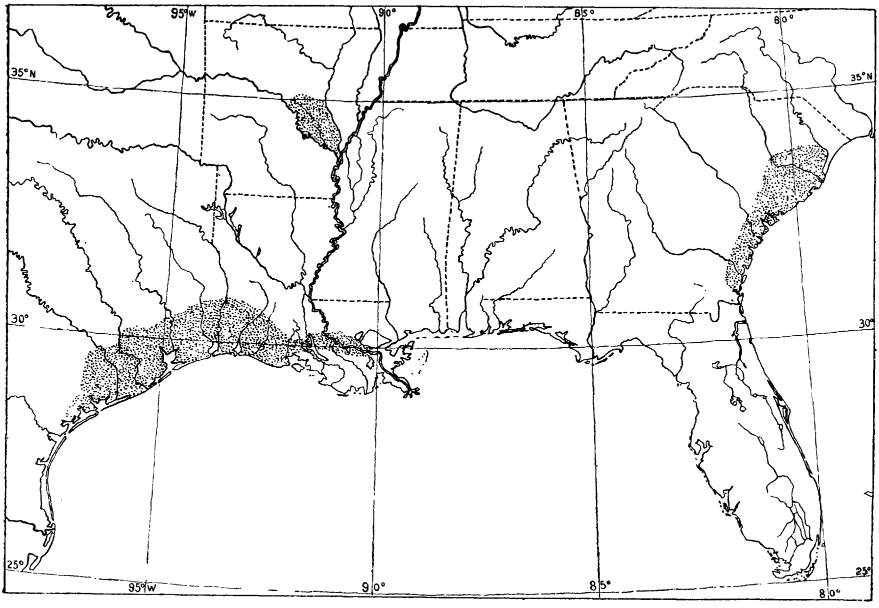

FIG. 1—Map of Rice Cultivation in the United States, 1910. Scale 1:17,000,000 (268.30 miles to an inch). Stippled areas represent rice districts.

Only Carolina rice had thus far been planted in the State, but in 1881 native seed was imported from British Honduras which was so satisfactory as entirely to supplant the Carolina variety. Its introduction marked a new era in Louisiana rice growing, and in eight years the State rose from third to first rank. This was accomplished not only by the larger acreage yield and the better quality of the Honduras rice, but by the extension of cultivation into the prairie lands, where it was grown both by irrigation and rainfall ditch storage, the latter being commonly designated as the "Providence method." In 1884 Maurice Brien, of Jennings, La., harvested his rice crop successfully with a Deering twine binding harvester, and this gave to the industry a new lease of life by reducing the cost of production at least 20 per cent.

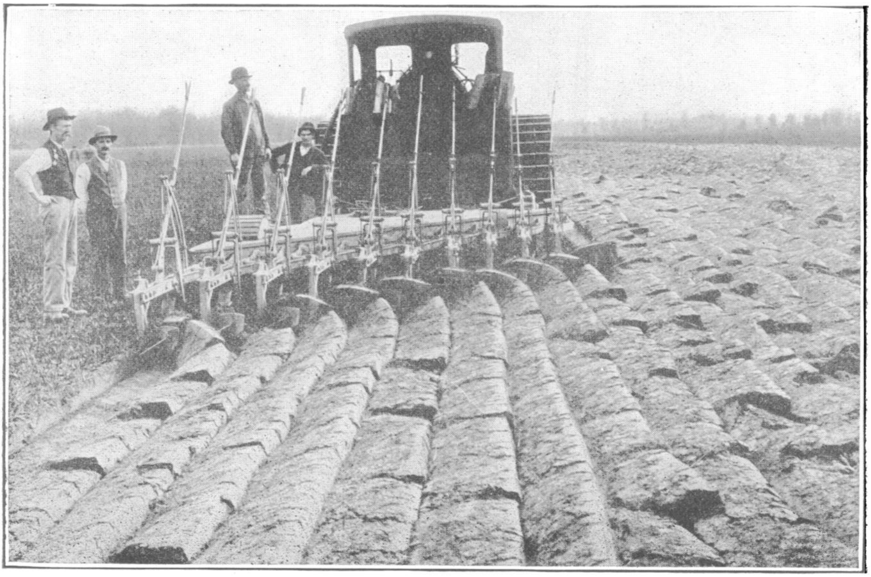

Fig. 2—Breaking ground for rice in Arkansas along the "Cotton Belt Route."

During the decade 1890-1900 Texas discovered her marvelous possibilities for rice growing, and responded to that realization by increasing her cultivated area from 2,000 acres (1895) to 70,000 acres (1900). In 1910, 264,000 acres were under rice cultivation, the yield of which was 8,738,000 bushels. Jefferson, Orange, Liberty, Jasper and Chambers counties constitute the present intensive producing belt.

While Texas, in the nineties, was making her phenomenal strides in rice growing, Arkansas gave no cause for expectation, the increase for the decade being from 9 to 25 acres. The rice interest in the State, however, began to show signs of life in 1902, when W. H. Fuller of Lonoke County obtained a large yield from a garden plot which was a representative soil of the Grand Prairie. By 1904 he had increased his rice field to 70 acres, from which he harvested an average of 74 bushels per acre. This returned a net profit of $56 per acre, a sum sufficient to have purchased, three years previously, 1,000 acres of the most fertile land in the prairie. It is now no surprise that the area in rice increased from 460 acres in 1905 to 40,000 acres in 1910, and that the price of land especially adapted to rice jumped from $10 to $100 per acre.

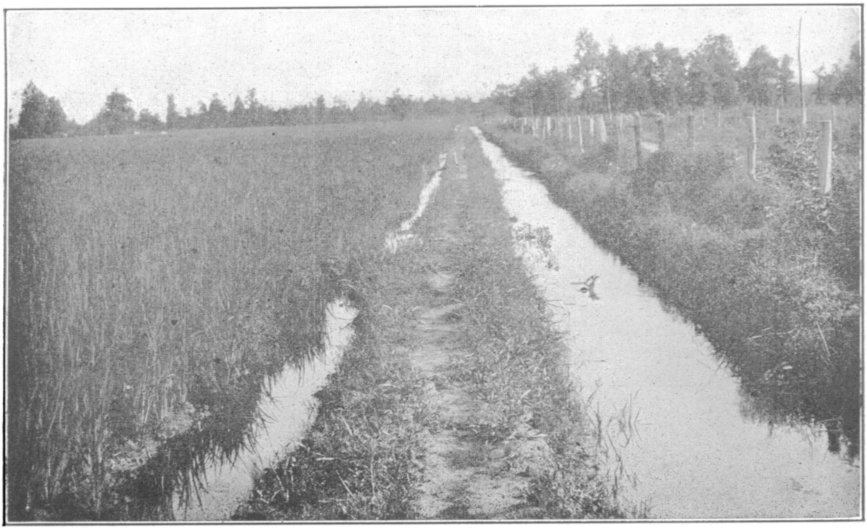

FIG. 3—Rice field at Waldenburg, Ark.

It is impossible to contemplate the progress of our domestic rice industry during the decade 1900-1910 without being impressed with its industrial and economic possibilities. It demands a new place in statistics and a new interpretation as to its national utility. In this short period rice growing has been raised from amphibious cultivation by hand to the attractive position of sanitary and scientific agriculture under machine cultivation. The cultivated area increased from 351,000 to 720,000 acres (105 per cent.), and production increased from 250,000,000 to 677,000,000 pounds (270 per cent.). The expansion of the industry is clearly indicated by the acreage figures, but more significant are the production figures, which reflect the progress in method. The total production from 1900 to 1910 exceeded that of 1850-1900, which must suggest even to those of doubtful mind a new era of American rice.

If we were to think of the domestic industry as a sort of side issue for supplying cheap food to the laborers of the swamp sections the review of the above figures would suggest a decline, if not an elimination, of rice imports. Instead of declining, however, they increased from 102,900,000 pounds to 225,000,000 pounds, an increase of 118 per cent., which exceeds the acreage increase during this period of unprecedented expansion. The domestic industry is protected by a duty of 2 cents per pound on clean rice. This enables the Southern rice growers to compete on a profitable basis with the cheap labor countries, British India, China and Japan.

According to the recent Census the population of the United States increased 21 per cent. during the last decade. In 1900 our per capita rice consumption was 4.1 pounds, but in 1910 it was 8.1 pounds. The history of this country gives no parallel example of so rapid an increase in the use of a staple food. We cannot accept it as the natural reflex of an enlarged production forced upon a somewhat indifferent purchasing public, for this increased domestic production was so inadequate to meet the demand, that the annual imports had to be more than doubled. A multiplicity of causes have conspired to bring the cereal into greater popular favor. Modern irrigation and the adaptation of agricultural machinery gave impetus to a more economic production. The manufacture of rice into palatable and nutritious breakfast foods constituted an entering wedge for a larger and more general consumption in the north and west, where it had been used to a very limited extent by native whites. The increase in the price of our staple foods which, according to the Government estimate, rose 36 per cent. from 1896 to 1910, made the consumers more receptive to experiments on cheaper foods. Probably more influential than any of these was the publicity given the commodity by the Rice Associations, the railroads, the milling corporations, the wholesale representatives, and the State Departments of Agriculture. Illustrative of this may be mentioned the unique experiment in 1909 of naming Sept. 30, as "Rice Day," in observance of which every railroad in the United States was requested to serve rice in varied and attractive preparations in all the dining cars and eating stations. The invitation was especially extended to hundreds of hotels, and through the newspapers every householder in the land was invited to participate.

Since rice is the chief food of more than half of the world's population, and has maintained that position through thousands of years, it would seem to be convincing evidence of its efficiency as a food. Many Americans, however, are prejudiced against it as a food, and think of it as a cheap boarding-house dish to be used as a last resort, but very useful in tiding over Asiatic famines. Those who have been served by the famous Creole cooks of Louisiana will readily admit that the variety and excellence of the prepared forms of rice give it high rank among cereals as human food.

Pathology and dietetics report in favor of rice because it is more readily and easily digested than other cereals and staple foods, being assimilated in an hour, as compared with four hours for brown bread, two and one-half hours for potatoes, two hours for lamb, and four hours for pork. Chemistry reports in its favor because it contains all the essential nutrients, being rich in carbohydrates, the fuel or energy producing nutrient, and abundant in proteid, the muscle building nutrient. Comparison with all our staple foods shows that for a balanced nutrition from equivalent weights rice is only excelled by oatmeal, peas and cheese; but on the basis of the cost of nutrients, it easily outranks these.

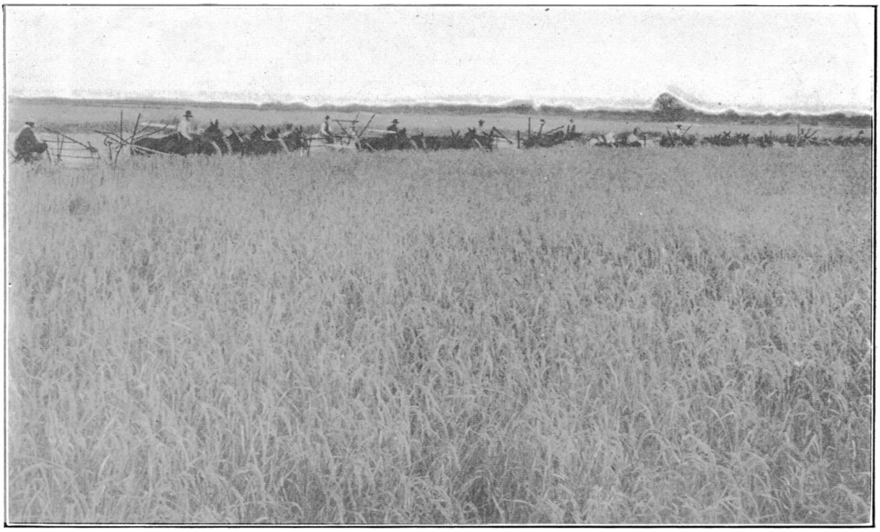

FIG. 4—Harvesting Rice, Sunset Route.

A food that digests so easily and completely as to be adapted to invalids, and that sustains so vigorously and powerfully as to meet the demands of the day laborer and the soldier, must possess merit which will give it a conspicuous place in the diet of any country adapted to its production.

The economy of the food is a feature of special interest. Served with fruits and meat, fruits and butter, sugar and butter, sugar and cream, or fruits and cheese, it constitutes a balanced ration. In China and Japan, where meat and meat products are scarce, the balance is effected by the use of beans and peas, both of which contain fats and proteids, the important nutrients of meats, butter and milk. Supposing that the *menu* is to consist of six parts, rice can supply three of them in palatable nutritious form without repeating any one in the same week. To make these three rice preparations proportionate in bulk and nutrition to the other-than-rice foods will require one pound to five persons for bountiful service. This one pound at the retail price of first grade domestic will cost 10 cents, which is about double the wholesale price. A fair grade containing some cracked rice costs 5 to 6 cents per pound, and possesses the same nutrition qualities as the "goods" or "primes." After making due allowance for a liberal use of accessories in the cooking, rice remains by a wide margin the cheapest food on the American market, the significance of which is more accurately appreciated when we recall that more than half of our native population spend half of their total income in the purchase of foods.

FIG. 5—Rice field, farm of S. H. Taggart, Stuttgart, Ark.

The necessity of utilizing by-products becomes more apparent and urgent with the growth of any industry. All the by-products of rice are adaptable to fields in which the Southern States are purchasers, rather than producers of a surplus. From one-fifth to onesixth of the total crop is low grade, and must either be sacrificed on the market or consumed at home. If ground and fed in a mixed ration it has about the same feeding value as corn meal, which is imported into the Gulf and Atlantic States in large quantities. Rice, molasses and cotton seed meal contain the nutrients for a well balanced ration. The same is true of rice and alfalfa, or rice and soja (soy) beans, and all of these are successfully grown in the South.

It is not yet determined how extensively rice will be used in the manufacture of flour, but the results are proving highly satisfactory, and each year brings a steady increase in the amount that is mixed with wheat flour, corn meal, oatmeal or buckwheat flour. Cracked rice, if clean and sound, may be profitably marketed in this form, and the lower grades consumed as a stock food.

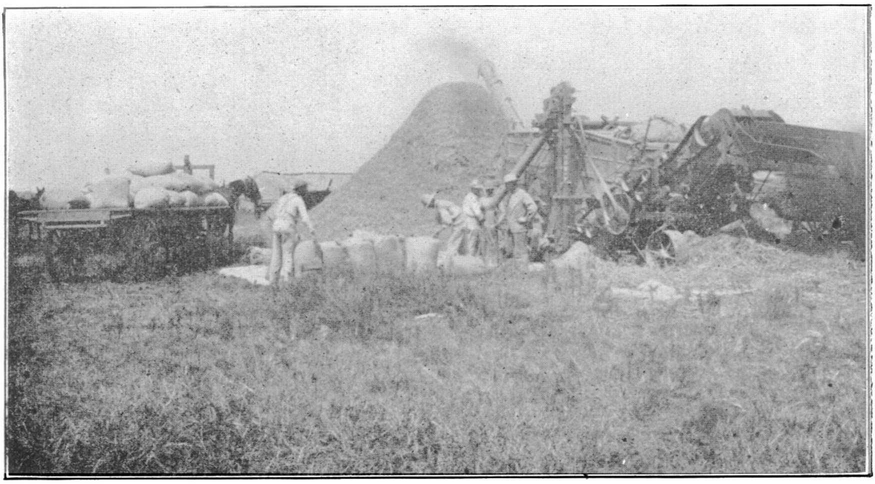

Fig. 6—Sacking Rice in Field.

The Japanese and Chinese manufacture starch and pastes from the less marketable grades and then make rice sugar of the factory by-product. Since considerable quantities of this rice sugar (*ame*) are imported by our Mongolian immigrants there is the possibility of supplying the demand with profit from the American rice fields and factories.

Thousands of tons of rice straw are now burned to clean the land for the next crop. This straw possesses more potential value per acre than is realized from the average acre of wheat in the United States. The rice fields average two to three tons of straw per acre, which is valuable both for stock feeding and the manufacture of paper pulp. The larger return can be realized by converting it into pulp, since two and one-fourth tons of straw yield one ton of pulp, which sells readily at $40 to $60 per ton. The cost of the pulp manufacture is about $20 per ton, leaving a large margin of profit to be divided between the rice grower and the pulp or paper manufacturer.

The expansion of the rice industry is a special benefaction to the agricultural interests of the cotton growing States. Not only will it make practicable the drainage and reclamation of more than 20,000,000 acres of marsh and swamp lands, which are now a menace to health and industry, but it affords a profitable rotation crop with cotton on millions of acres of prairie and upland favorably situated for irrigation. The boll weevil is hastening its destructive march eastward over the cotton belt, and has proved most formidable and destructive in the Mississippi delta and the other alluvial lands of the coast. The most serious barrier to combating this enemy is the persistence with which it hibernates and survives in the Spanish moss

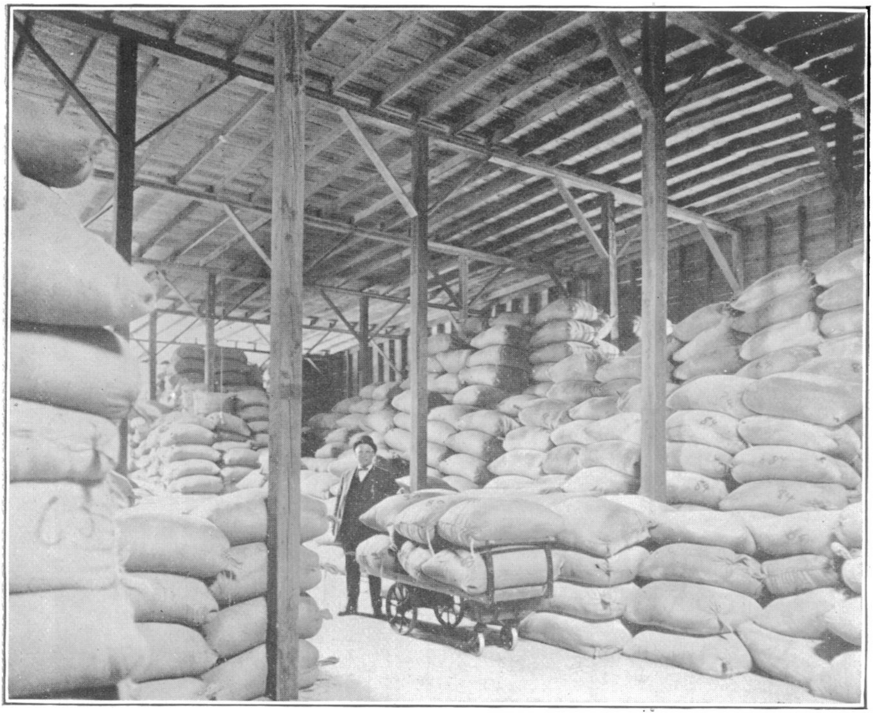

FIG. 7—Interior of Rice Mill at Stuttgart, Ark.

of the swamps. It seems, therefore, probable that an increased rice production will make possible a larger cotton production in the rice belt, and cotton is the overshadowing agricultural asset of the South.

In the vigorous exploitation of any money crop the temptation is to rob the land by the one crop system. Virginia has, for many years, been exhausting the soils of her tobacco belt. The farmers of the upland cotton belt could clothe every man, woman and child in the respective states with the eleminated cotton production which has resulted from continuous cropping in cotton. The great corn belt states presumed on the fertility of their lands until the diminished acreage yield stimulated a crusade for soil restoration and soil maintenance. Will the rice growers follow heedlessly, or profit by these examples?

Bushel for bushel, rice is not so exhaustive of soil fertility as the other American grains, but exceeds them on the acreage basis because of the larger yield. Rice averaged 33 bushels per acre in 1909, as compared with 15 for wheat and 16 for rye. An acre of rice producing 33 bushels removes from the soil 16 pounds of phosphoric acid, 42 pounds of potash and about 60 pounds of nitrogen. To replace this by the purchase of commercial fertilizers would cost $15 to $18 per acre, which is a prohibitive tax on the industry at present prices. The potash is largely returned to the land if the straw is not removed, and the nitrogen must be maintained by stock feeding and by rotating with legumes—such as cowpeas, beans, vetches, peanuts and clovers—which have the power of gathering nitrogen from the air.

Rice soils will rapidly deteriorate under any system of rotation unless adequate drainage is maintained, and there is no reclamation so expensive as that of acid and alkali soils. Under inferior cultivation, the one crop system, or inadequate drainage, red rice springs up and flourishes. This, even in small quantities, makes the crop unsalable.

We have reason to expect the rice industry to develop and progress on a more systematic, judicious and profitable basis than has been demonstrated in any of our staple crops, since irrigation projects and culture in both the arid and humid states are under the skilful supervision of engineering and agricultural experts. The United States Department of Agriculture is coöperating with the rice producing states in the study of the present and possible field, and has established a Rice Experiment Station at Crowley, La., for the instruction and protection of every grower of rice.